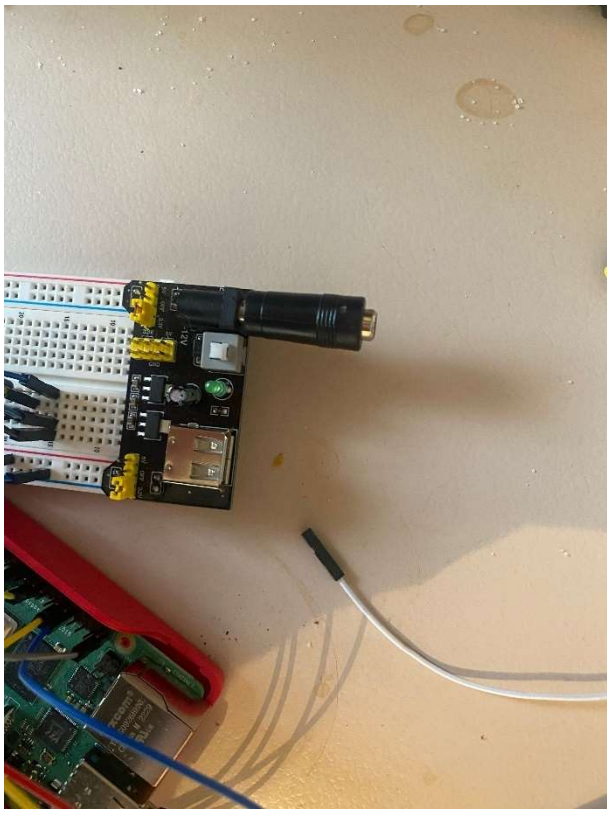
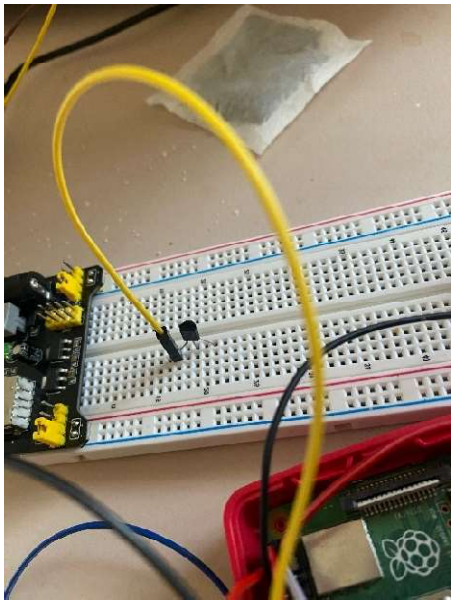
User Manual: how to setup the Tea Machine:

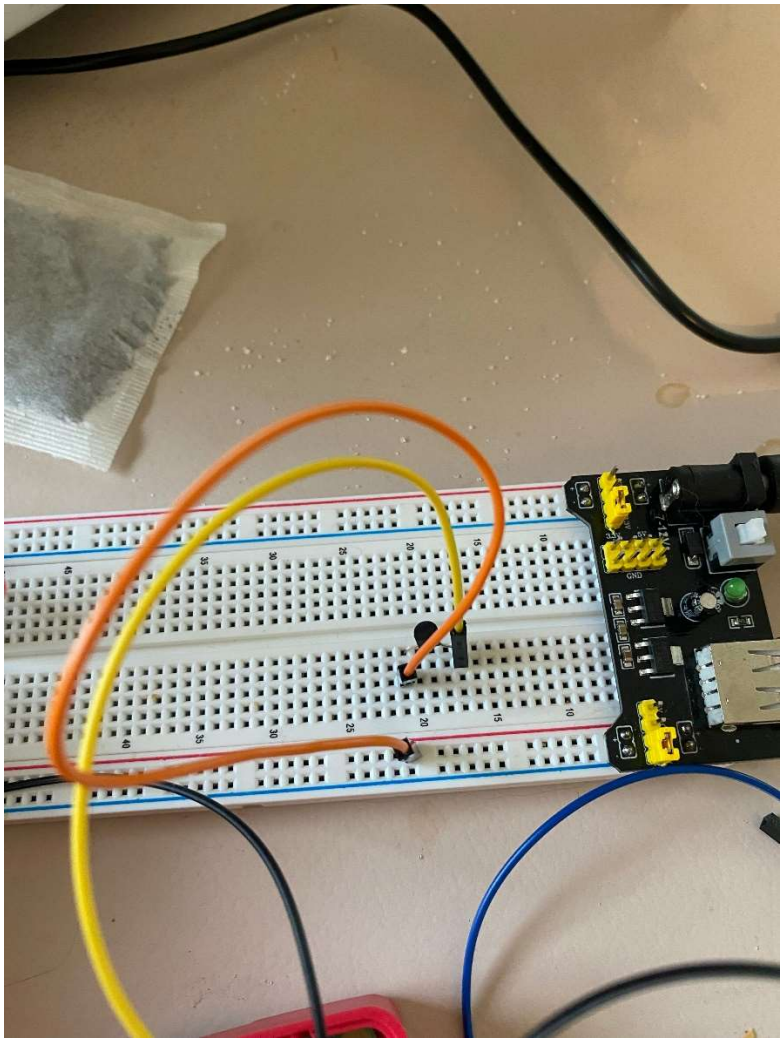
1. Connect power supply module to bread board, 3.3 volts for both sides using the plastic jumpers



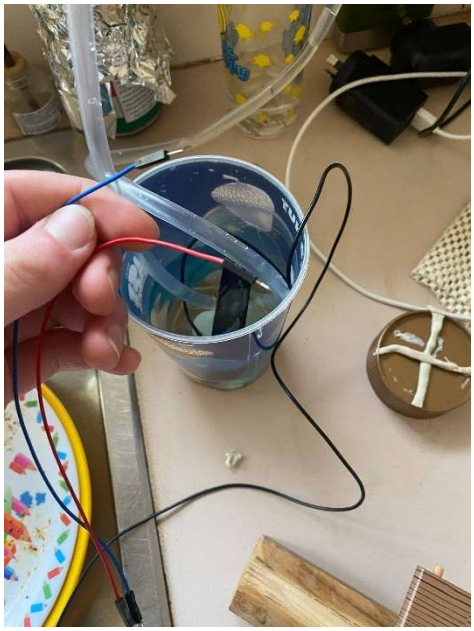
2. Place 3 PNP transistors on the breadboard and connect any GPIO pin from the raspberry pi to the base pin of the transistors.

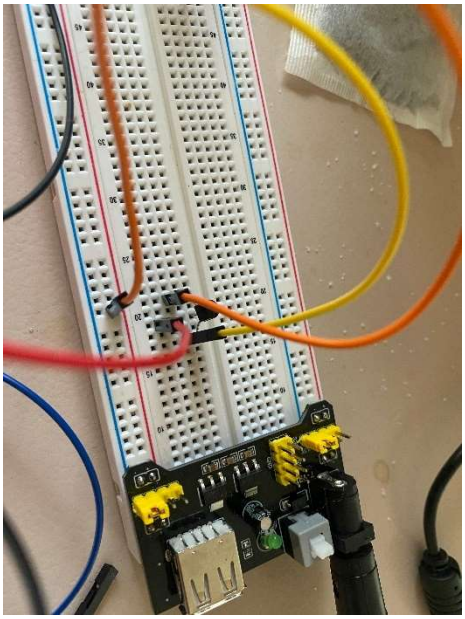


4. Connect the collector pins to a voltage source, either the RPi or the power supply module. 5V for the heating element, 3.3V for the pump and the conveyor belt.



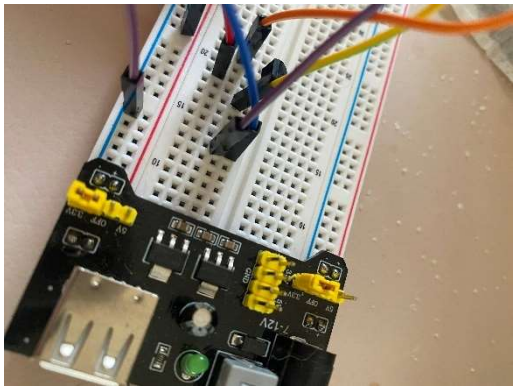
5. Connect the emitter pins to the voltage input of each of the components (water pump for this example)

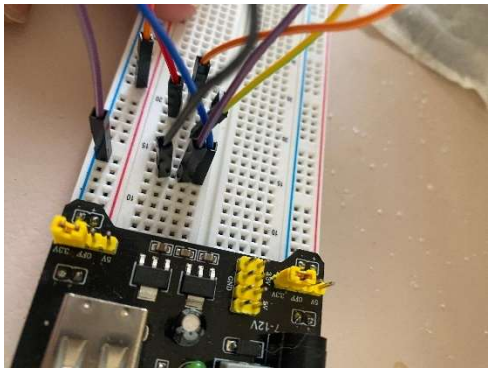




6. Connect the negative pin of each of the components to both the ground of the power supply and the raspberry pi. If using the raspberry pi for both power and transistor switching, only connect to the RPi ground.

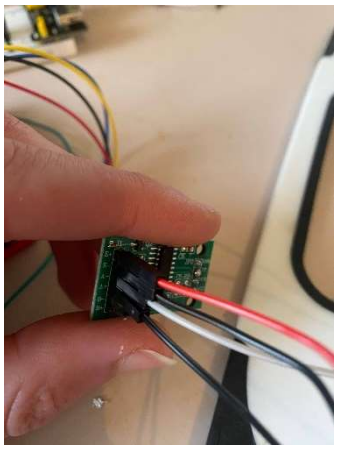
(Water pump negative pin to power supply ground) *(adding connection to RPI ground; two ground sources)*





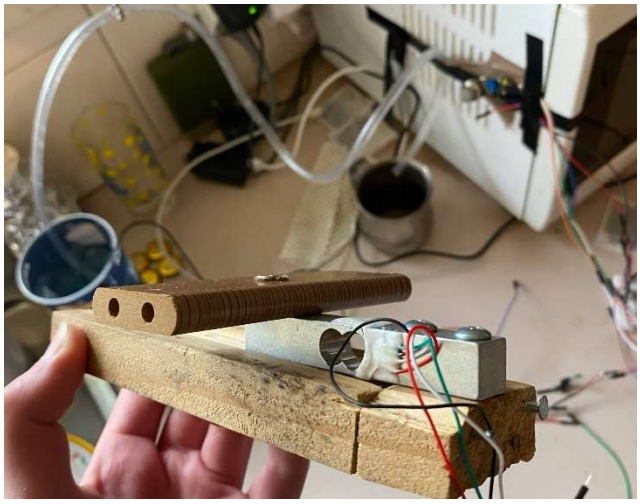
Except for the different voltage levels, all three of the transister powered components can be connected with the same steps.

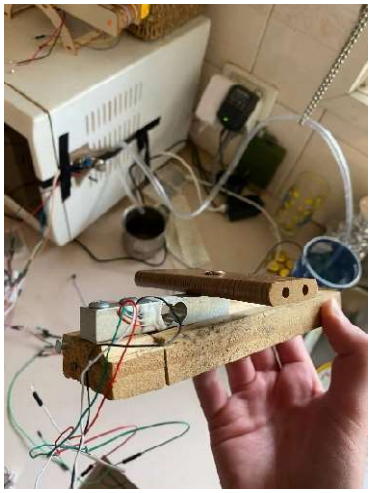
7. Configure the HX711 and its amplifier as following: Red to E+, Black to E-, White to A- and Green to A+.



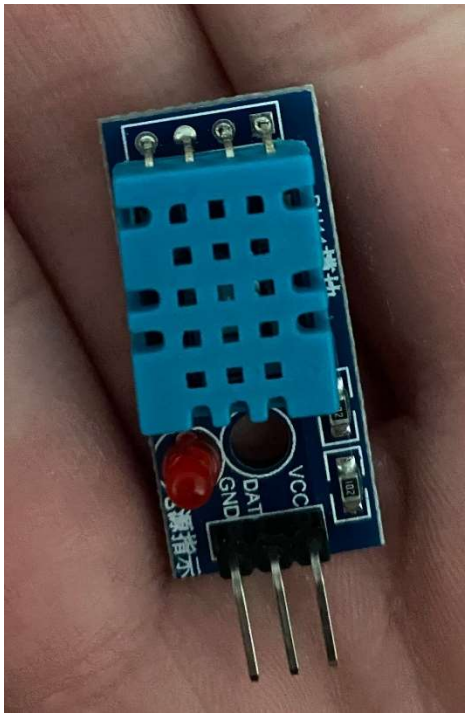
8. Connect the hx711 amplifier voltage and ground to a 5V voltage source and ground, then the Data out and Clock pins to any GPIO on the RPi

9. the HX711 mount:





10. Connect the DHT11, If it is mounted to one of these circuit boards with a resistor then just connect Ground to Ground, VCC to 5V and DAT to a GPIO pin.

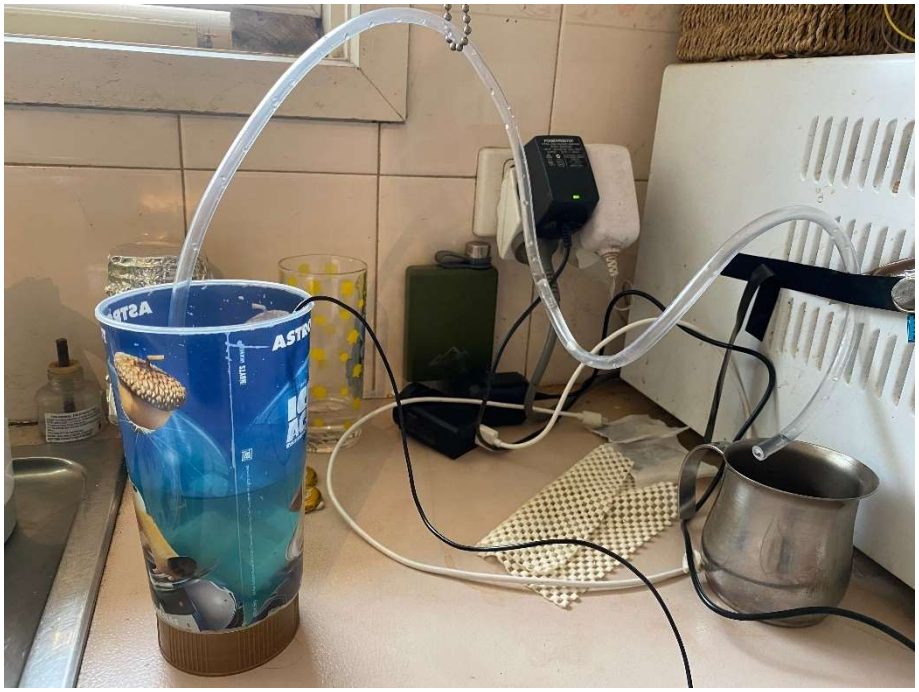


Otherwise, you need a resistor between the VCC and 5V source.

11. (OPTIONAL) Connect the MQ2 “smoke sensor”.

12.
Water pump positioning and piping suspension:
Suspend the water piping so that the water doesn’t have to travel directly upwards; the 3.3v pump is too weak to fight gravity.
Also, experiment with different heights for the water source: too low and the pump won’t

be able to push the water through, too high and the water won't stop flowing after the pump has stopped, leading to an overflow.



Same with the conveyor belt, experiment with different positions
Install all the libraries

13.

If using PNP transistors, the following code must be run before doing anything else (the absence of a GPIO clean up is deliberate).

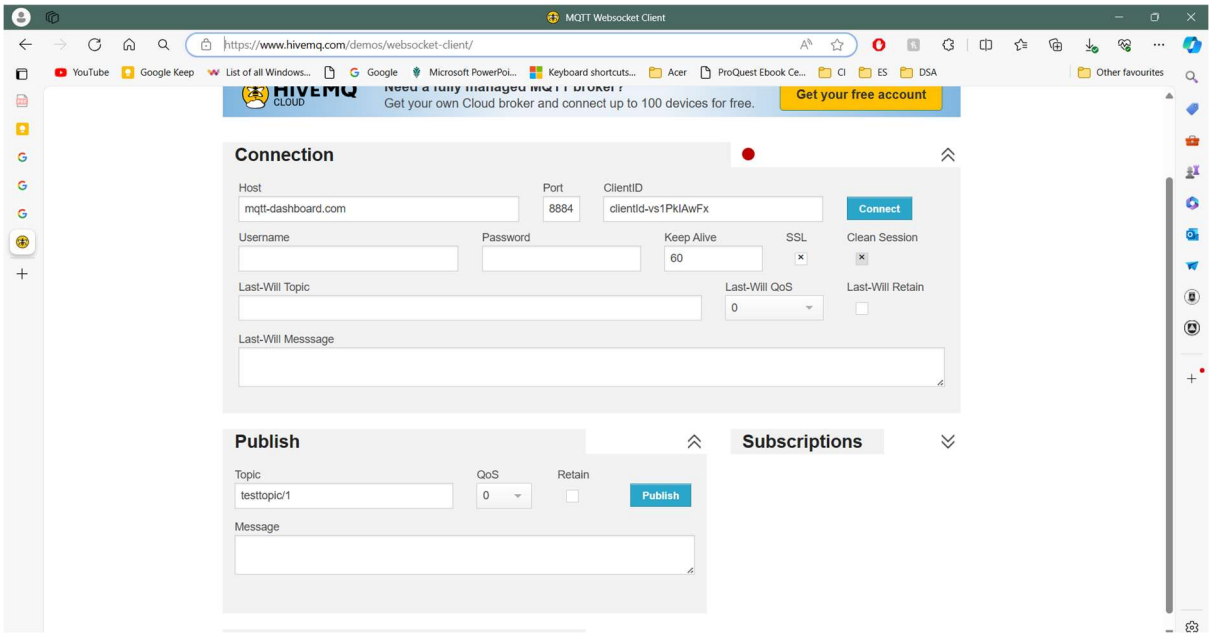
```
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BCM)


Dispence_pin = ?

water_pin = ?

heating_pin = ?



GPIO.setup(Dispence_pin, GPIO.OUT)

GPIO.setup(water_pin, GPIO.OUT)

GPIO.setup(heating_pin, GPIO.OUT)

GPIO.output(Dispence_pin, GPIO.HIGH)

GPIO.output(water_pin, GPIO.HIGH)

GPIO.output(heating_pin, GPIO.HIGH)
```

If you don't do this, the transistors will allow current to flow through as soon as the program starts. The conveyor belt, heating element and water pump will all start going. Big mess!

14. creating and publishing to a topic

Go to this link:

[MQTT Websocket Client (hivemq.com)]



Here you can publish to a topic that doesn't yet exist and it will be created automatically. No need to create the topic separately. Leave everything in the **Connection** box as default.

15.
Use these small pieces of code to test your water pump and dispencer

```
import time
import RPi.GPIO as GPIO


GPIO.setmode(GPIO.BCM)


Dispence_pin = 10
water_pin = 11
heating_pin = 12
GPIO.setup(Dispence_pin, GPIO.OUT)
GPIO.setup(water_pin, GPIO.OUT)
GPIO.setup(heating_pin, GPIO.OUT)
GPIO.output(Dispence_pin, GPIO.HIGH)
GPIO.output(water_pin, GPIO.HIGH)
GPIO.output(heating_pin, GPIO.HIGH)


#WATER PUMP TEST
```

```
"""
print("Water Pump Test")
print("off")
GPIO.output(water_pin, GPIO.HIGH)
time.sleep(3)
print("on")
GPIO.output(water_pin, GPIO.LOW)
time.sleep(10)
"""

#CONVEYOR BELT TEST
"""
print("Conveyor Belt Test:")
print("off")
GPIO.output(Dispence_pin, GPIO.HIGH)
time.sleep(3)
print("on")
GPIO.output(Dispence_pin, GPIO.LOW)
time.sleep(10)
"""



GPIO.output(Dispence_pin, GPIO.HIGH)
GPIO.output(water_pin, GPIO.HIGH)
GPIO.output(heating_pin, GPIO.HIGH)
GPIO.cleanup()
```

One last thing about the DHT11 and the Raspberry Pi. Basically there is an issue with the library that many, including myself experienced:

https://forums.adafruit.com/viewtopic.php?t=169472

Long story short, you have to reboot the system each time you want to use the DHT11. There are work arounds, but I opted not to implement any of them. As a safety mechanism, I like that this program can only run once, then requires a manual reset to run again.

Happy sipping :)